Name: _____ Date: _____

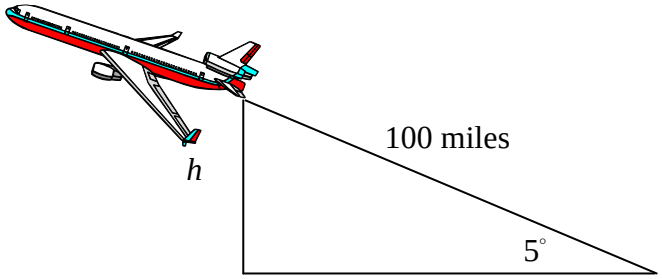
Applied Trigonometry Problems
Algebra 1

Over the last few lessons, we have discussed how to use trigonometry to solve for the missing sides or angles of a right triangle. Today, we will continue solving such problems in the context of "real life" scenarios.

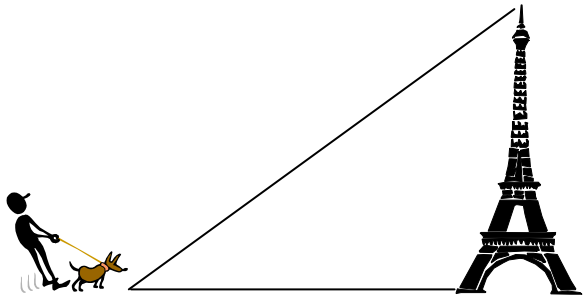
THE TRIGONOMETRIC RATIOS

$$\sin A = \frac{\text{opp}}{\text{hyp}}; \quad \cos A = \frac{\text{adj}}{\text{hyp}}; \quad \tan A = \frac{\text{opp}}{\text{adj}}$$

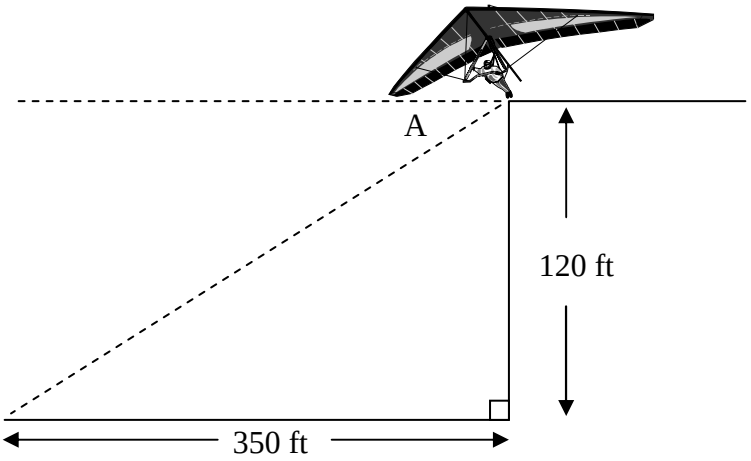
***Exercise* #1:** An airplane takes off at an angle of 5° from the ground. If the airplane traveled 100 miles, how far above the ground is it? Round to the nearest *foot*. Note that there are 5280 feet in one mile. [The 5° angle in this problem is called an **angle of elevation**.]



***Exercise* #2:** While walking his dog, Pierre sees the Eiffel Tower and notices that the angle of elevation is 24° to its top. If Pierre is 2215 feet from the middle of the base of the arch, how tall is the Eiffel Tower? Round to the nearest foot.



***Exercise* #3:** Harold is hang gliding off a cliff that is 120 feet high. He needs to travel 350 feet horizontally to reach his destination. To the *nearest* degree, what is his angle of descent, *A*? [Note: This angle you are finding is called an **angle of depression** or **an angle of declination**.]



***Exercise* #4:** Francisco is trying to reach a window with a ladder that is 15 feet long. Find the angle that the ladder must form with the ground in order to reach a window that is 11 feet high. Sketch a diagram below that represents this scenario. Round to the nearest degree.

***Exercise* #5:** A ladder that is 12 feet long has its base 5 feet from the edge of a building against which it is leaning. In order to be stable, the angle the ladder makes with the ground must be less than 60 degrees. Is this ladder stable? Justify.

***Exercise* #6:** A tree casts a shadow that is 32 feet long. Find the height of the tree if the angle of elevation of the sun 35.7°. Round your answer to the nearest foot.

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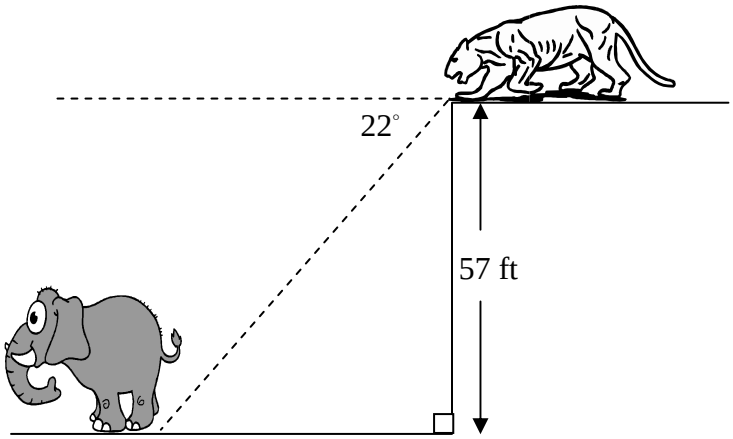
Applied Trigonometry Problems
Algebra 1 Homework

Applications

1. Sitting at the top of a 57 ft. cliff, a lioness sees an elephant. The angle of depression from the lioness to the elephant is 22°. What is the shortest distance from the lioness to the elephant? Round to the nearest tenth of a foot.

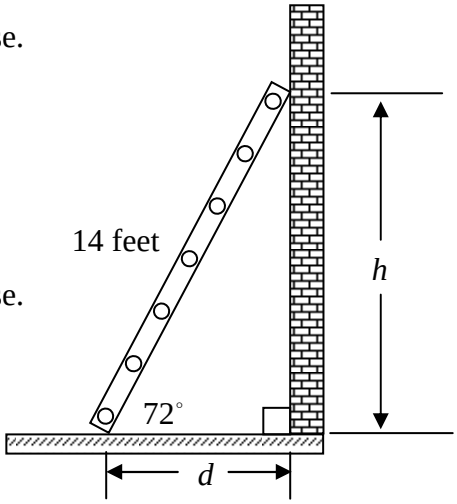


2. An airplane is trying to take off; however, there is an obstruction in the runway. The obstruction is 20 feet high, and the plane is 80 feet from the base of the object. At what angle must the plane take off to avoid hitting the obstruction? Round to the nearest degree.

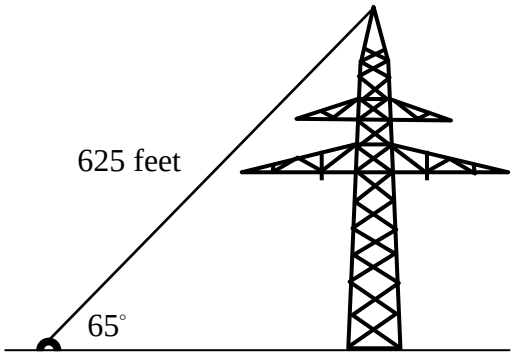
3. A 14 foot ladder is leaning against a house. The angle formed by the ladder and the ground is 72°.

(a) Determine the distance, *d*, from the base of the ladder to the house. Round to the nearest foot.

(b) Determine the height, *h*, the ladder reaches up the side of the house. Round to the nearest foot.

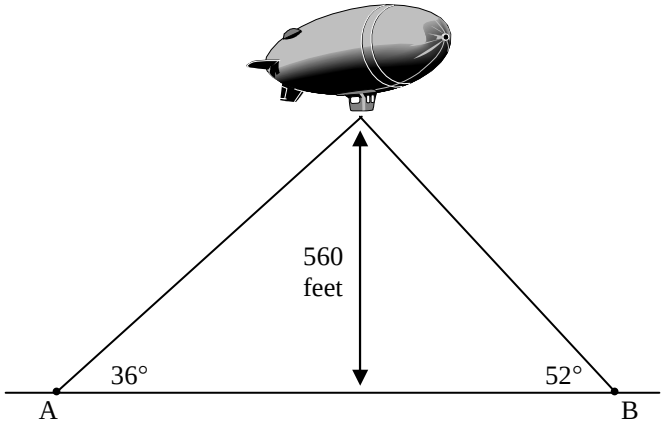


4. A 625 foot long wire is attached to the top of a tower. If the wire makes an angle of 65° with the ground, how tall is the tower? Round your answer to the *nearest tenth* of a foot.



5. Luke casts a shadow that is 6.3 feet long. Find Luke's height if the angle of elevation to the sun is 40°. Round to the nearest tenth of a foot.

6. A blimp hovers above the ground at an altitude of 560 feet. Two points, *A* and *B*, located on the ground are shown below with angles of elevation to the blimp of 36° and 52° respectively. Determine the distance between the two points, *A* and *B*, to the nearest foot. (Note – you will have to use two trigonometric ratios to solve this problem.)

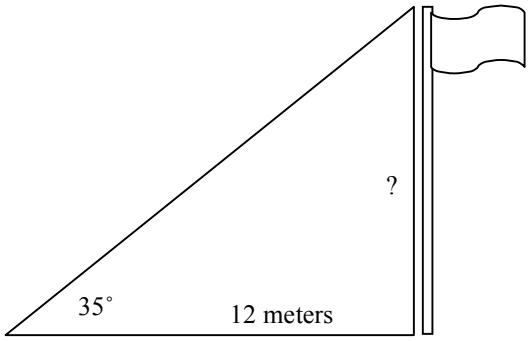


Free Particle Model

Trigonometry Practice Problems

Find the magnitude of the side or the angle indicated with a "?" for each of the following triangles:

1.



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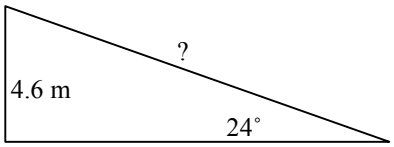
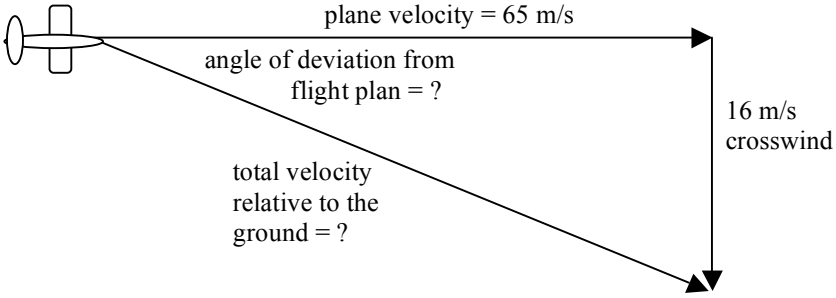


3.



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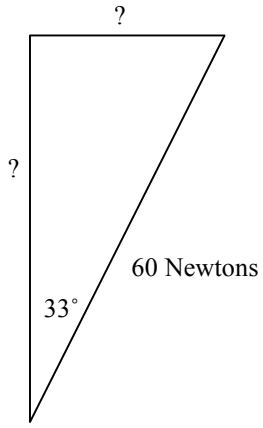
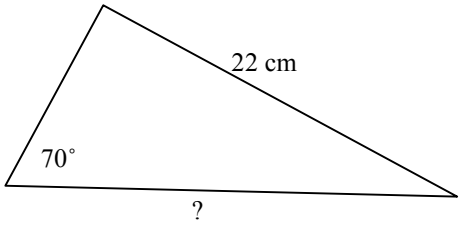


5.



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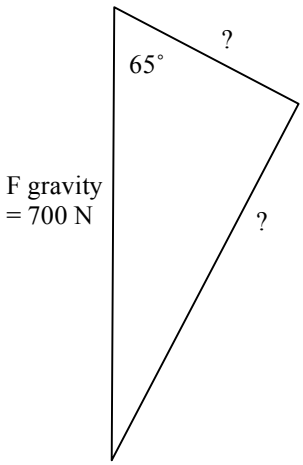

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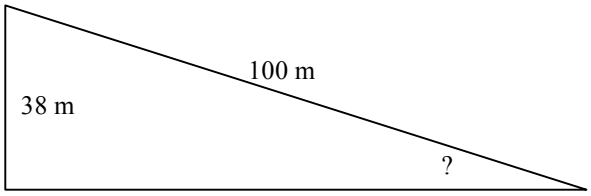

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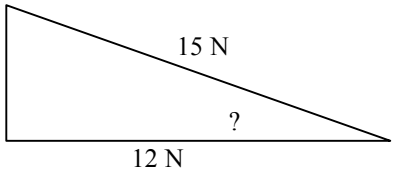

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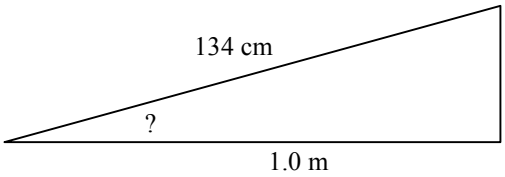

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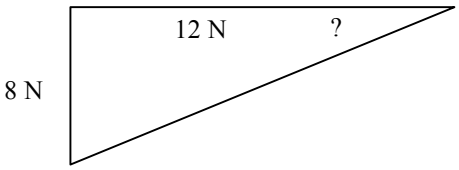

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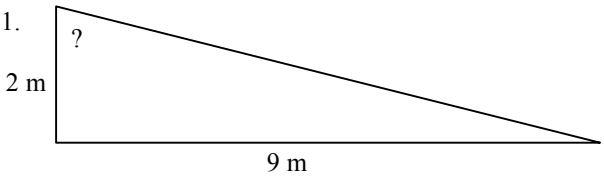
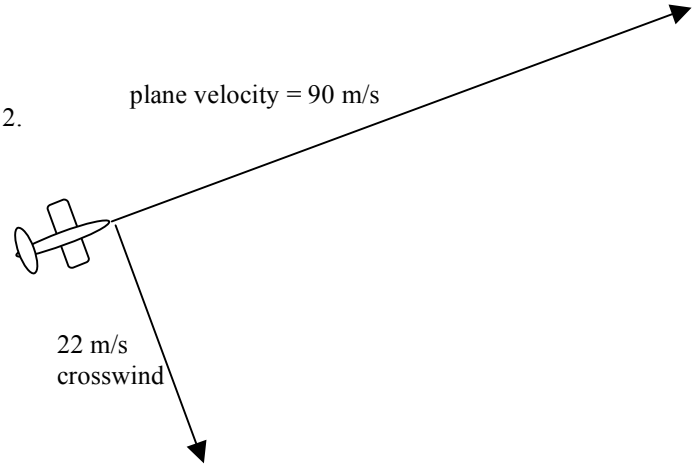


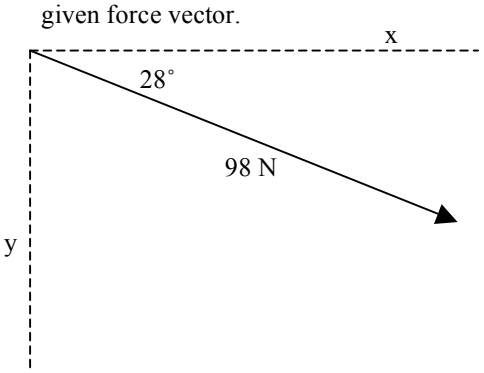
12.



total velocity relative to the ground = ?

angle of deviation from flight plan = ?

13. Find the x and y components of the given force vector.



14. Find the x and y components of the given force vector.